

CLAIMS

What is claimed is:

1. A method for persistently tracking volatile memory faults, the method comprising:
 - 5 detecting a memory error relating to at least one dynamic random access memory (DRAM) unit on a particular memory module; and writing an entry pertaining to the memory error in non-volatile memory of a fault storage unit on that particular memory module.
- 10 2. The method of claim 1, wherein the particular memory module comprises a particular dual in-line memory module (DIMM) of a plurality of DIMMs in a memory system.
- 15 3. The method of claim 1, further comprising:
 - determining a scope of the detected memory error.
4. The method of claim 3, wherein the scope of the memory error is determined by a logical analysis of a history of faults associated with the 20 particular memory module.
5. The method of claim 1, wherein the entry comprises a DRAM unit identifier, a low bit number of a range, a high bit number of the range, and tag bits indicating time of last failure and number of occurrences of failure.
- 25 6. The method of claim 1, further comprising:
 - reading the entry from the non-volatile memory of the fault storage unit;
 - and
 - removing memory bits associated with the memory error from a set of 30 usable memory.
7. The method of claim 1, further comprising:

removing memory bits associated with the memory error from a set of usable memory while the particular memory module remains online.

- 5 8. A memory module that persistently tracks volatile memory faults, the
memory module comprising:
a plurality of dynamic random access memories (DRAMs); and
a fault storage unit including non-volatile memory configured to store
entries pertaining to faults in the plurality of DRAMs on that
10 memory module.
9. The memory module of claim 8, further comprising:
interface circuitry configured to provide read and write access by a
memory error interface unit on a circuit board to the non-volatile
15 memory of the fault storage unit.
10. The memory module of claim 8, wherein an entry stored in the non-volatile
memory of the fault storage unit includes a DRAM identifier and a
range of bits.
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11. The memory module of claim 8, wherein the memory module comprises a
dual in-line memory module (DIMM).
12. A circuit board of a system, the circuit board comprising:
a plurality of connectors, each connector configured to connect to a
25 memory module which includes multiple volatile memory units and
a non-volatile fault storage unit;
a memory controller configured to read and write data into the volatile
memory units of memory modules; and
a memory error interface configured to provide read and write access to
30 the non-volatile fault storage units of the memory modules.
13. The circuit board of claim 12, further comprising:

a processor dependent hardware (PDH) interface communicatively coupled between a central processing unit and the memory error interface.

- 5 14. The circuit board of claim 13, further comprising:
a processor dependent code (PDC) unit accessible via the PDH interface,
wherein the PDC unit includes boot code and error handling code.
- 10 15. The circuit board of claim 14, wherein the boot code includes instructions
to read the entries from the non-volatile fault storage unit and to remove
memory bits associated with the entries from a set of usable memory.
- 15 16. The circuit board of claim 14, wherein the error handling code includes
instructions to write entries relating to detected memory errors into the
non-volatile fault storage unit and to read said entries from the non-
volatile fault storage unit.
- 20 17. The circuit board of claim 12, wherein the volatile memory units comprise
dynamic random access memory, and wherein the plurality of memory
modules comprise dual in-line memory modules (DIMMs).
- 25 18. A memory system comprising:
means for reading data from and writing data to volatile memory units on
a plurality of memory modules; and
means for reading error entries from and writing error entries to a non-
volatile fault storage unit on each memory module.